ARE WE IMPROVING?: THE NEIGHBORHOOD QUALITY OF HOUSING CHOICE VOUCHER RECIPIENTS IN HOUSTON, TEXAS, AFTER HURRICANE HARVEY

A Thesis

by

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ABSTRACT

This study examines the neighborhood outcome and quality of Housing Choice Voucher (HCV) recipients in Houston, Texas before and after Hurricane Harvey. The purpose of this thesis is to discover if neighborhood quality improved for HCV recipients in after Hurricane Harvey. The study revealed where HCV recipients found residence after navigating the housing market, characteristics of the new neighborhoods, amenities and services within proximity, and how those results compare to their previous residence. Neighborhood quality was distinguished by the overall culmination of factors including poverty rate, educational attainment, resources and amenities, floodplain, and social vulnerability. Resources and amenities used in this study include libraries, schools, hospitals, parks, and community centers. The results show that in comparison to original residences, HCV recipients are accessing areas of low poverty and high education attainment, however, resources and amenities are further away. Ultimately, HCV recipients were accessing higher quality neighborhoods, but distance and accessibility to resources and amenities was a tradeoff. A description of future research to be conducted on this topic is outlined at the end.

DEDICATION

This thesis is dedicated to my family, friends, and mentors; without you all, I would not be here.

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All other work conducted for the thesis was completed by the student independently.

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1. INTRODUCTION

The Housing Choice Voucher (HCV) program is administered by the U.S. Department of Housing and Urban Development (HUD) and assists low-income families, the elderly, and the disabled to afford decent, safe, and sanitary housing in the private market (U.S. Department of Housing and Urban Development, n.d.). The federal government subsidizes the rent of the voucher holder, enabling them to pay for housing they would otherwise be unable to afford (U.S. Department of Housing and Urban Development, n.d.).

The HCV program is intended to help low-income households access higher quality housing in higher opportunity neighborhoods. Higher quality housing and neighborhoods are defined as having a de-concentration of poverty and minority residents. Neighborhood quality after residential moves achieved by vouchers is one metric used to address the HUD's goals. Monitoring neighborhood quality allows policy analysts and practitioners the opportunity to see where residents are moving and if there needs to be an intervention to improve their outcomes.

The HCV program has long been studied by professors, economists, and policy analysts to determine its effectiveness to reduce concentrations of poverty and increase accessibility of high opportunity areas. Results from these studies have been mixed. Studies have found that though HCV recipients relocate in lower poverty neighborhoods, the overall neighborhood quality is only marginally improved when compared to previous residence (Reina, 2019; Reina, Acolin, & Bostic, 2019; Feins & Patterson,

2005; McClure, Schwartz, & Taghavi, 2014; Wood, Turnham, & Mills, 2008). However, other studies have found HCV recipients do not move into better quality neighborhoods after voucher use (Schwartz, McClure, & Taghavi, 2016; Eriksen & Ross, 2013). The results of the HCV program are highly dependent upon characteristics city of voucher use, such as the local housing market and anti-discrimination laws, if present. Note that the included studies involve moves provoked by factors not including natural disasters as literature regarding HCV moves after disasters is sparse.

Researchers have noted unintended consequences and unaddressed barriers of the program. The HCV program claims success when participants are able to make residential location decisions consistent with the program's aforementioned goals (Basolo and Nguyen, 2005). Mobility has disproportionate outcomes for some movers. Multiple factors and barriers influence the ability of HCV recipients to relocate into lower poverty neighborhoods. Factors and barriers include, but are not limited to, discrimination based on race/ethnicity or source of income, lack of rental mobility assistance, and potential loss of social capital. For example, studies have found that African Americans are commonly live in worse neighborhoods in comparison to other racial and ethnic demographics (DeLuca, Garboden, & Rosenblatt, 2013; Wang & Walter, 2018). Another outcome would be the loss of access to previous built in original neighborhoods. Daycare, culturally significant grocery stores, and social ties are examples of resources and services some HCV recipients must leverage when determining to leave their original neighborhood. These are but a few reasons as to why some families are unable to find higher opportunity neighborhoods.

To aid HCV recipients in finding affordable housing, HUD established a rule in 2016 stating payment standards will use fair market rents (FMRs) that are calculated for ZIP codes within metropolitan areas instead of metropolitan area-wide FMRs. Payment standard is the maximum subsidy a public housing authority (PHA) can pay on behalf of a family (U.S. Department of Housing and Urban Development, n.d.). Metropolitan area-wide FMRs were often too low to adequately cover rent in high opportunity and low poverty neighborhoods. ZIP code based FMRs were named Small Area Fair Market Rents (SAFMRs). Calculating payment standards for smaller areas allows a more accurate depiction of what a fair amount of rent would be for specific areas. SAFMRs are intended to make high opportunity areas more accessible to HCV recipients by providing a subsidy which could adequately cover rents in the high opportunity areas, resulting in a reduced number of voucher recipients residing in areas of high poverty concentrations (U.S. Department of Housing and Urban Development, n.d.). The Houston Housing Authority (HHA) operates using SAFMRs in hopes of aiding its residents in finding higher opportunity areas around the city, which is why it is important to be noted in this study. The HHA introduced a new, higher payment standard in 2018 to allow HCV recipients a greater chance at accessing areas of higher rent. Areas of higher rent tend to be deemed as high opportunity because of their low poverty concentration and high employment rates.

Social vulnerability is defined as "the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard" (Blaikie, Cannon, Davis, & Wisner, 1994). Disasters often exacerbate

pre-existing issues within communities (Olshansky, Hopkins, & Johnson 2012; Bolin & Stanford 1991; Greene 1992). For cities with a limited amount of housing, especially affordable for those of low income, a disaster will make them worse; this was the case for Houston after Hurricane Harvey.

Approximately one-third of households in Houston were either damaged or destroyed (Elliot, 2017). With a renter population that amounts to approximately 45% and 6% of apartments being damaged or destroyed by Harvey, Houston's renter market took a significant hit. As the housing market tightened even further, it became increasingly difficult for Houstonians to access affordable housing. This reality was even worse for low income residents. "Given the limited supply of affordable housing before the storm and the increased demand for rental housing after the storm, renter — especially if they are lower- and middle-income — may face years of housing insecurity" (Tolson, 2017).

The Federal Emergency Management Agency (FEMA) provides Direct Temporary Housing Assistance for applicants whose primary residence is uninhabitable as a direct result of a presidentially-declared emergency or major disaster (Federal Emergency Management Agency, 2018). Temporary Housing Units (THUs) are provided through Direct Temporary Housing Assistance and include a house, apartment cooperative, condominium, manufactured home, or dwelling FEMA acquires and makes available (Federal Emergency Management Agency, 2018).

FEMA did not adequately handle temporary housing in Houston during Hurricane Harvey. Houstonians were forced to reside in tents and hotels even two

months after Harvey impacted the area (Formby, 2017). FEMA reported that its failure to provide a suitable and effective temporary housing program resulted in their lack of money and employees to adequately respond to the numerous disasters that had transpired. During the 2017 hurricane season, FEMA was supporting 692 federally declared disasters, thus limiting the available resources and manpower (Atkin, 2018).

1.1. Research Question and Hypothesis

As the housing market in Houston tightens even further after Hurricane Harvey, it has become increasingly difficult for low-income residents to access affordable housing. It is important to include low-income residents within the scope of research, as they are more vulnerable to natural disasters due to issues of place and type of residence, building construction, and social exclusion (Fothergill & Peek, 2004).

The purpose of this thesis is to discover the neighborhood quality of HCV recipients in Houston, Texas who moved after Hurricane Harvey. More specifically, this study seeks to discover where HCV recipients find residence after navigating the tight housing market, characteristics of the new neighborhoods, resources and services within proximity, and how the combination of these results compare to their previous residence. Resources and amenities used in this study include libraries, schools, hospitals, parks, and community centers. The culmination of the aforementioned variables will indicate neighborhood quality. Within these categories, heightened attention will be given to the poverty rates, minority concentrations, available resources, educational attainment, and unemployment rates sub-categories. The study hypothesizes that HCV recipients are

unable to access significantly higher opportunity neighborhoods in comparison to their original residences.

1.2. Relevance of Study

This study is timely and relevant because it will show where Houston HCV recipients have moved and if their new neighborhoods meet the goals outlined by the HCV program. Findings showing HCV recipients accessing lower quality neighborhoods should prompt a deeper investigation of the program and its practices. If the program is left untouched and unmanaged, policy makers and practitioners lack knowledge of how the program is performing. Due to the use of a conservative sample – HCV recipients effected by Hurricane Harvey – this study is highly specific to Houston. Though the scope and research questions are narrowly regarding a specific event, as disasters become more frequent, this new information could highlight the need for program interventions and modifications to improve the outcomes.

2. LITERATURE REVIEW

The literature review consists of four sections that highlight existing knowledge used to guide this thesis. Major topics include social vulnerability, the vulnerability of renters, the HCV program, mechanisms HUD uses to increase affordability and access, and challenges HCV recipients face when seeking housing. The literature reviewed are primarily peer-reviewed journal articles and government documents, with the inclusion of few news reports.

Due to the recent nature of the disaster, studies have not yet been conducted to determine Hurricane Harvey's impact on small area fair market rents and consequently the locational outcome of HCV families. However, there is current knowledge as to the general outcomes of HCV families who move, and the results of these studies are mixed.

2.1. Social Vulnerability

Since its conceptual inception, vulnerability has been defined in several ways. Early definitions of vulnerability defined it in terms of physical vulnerability, the increased risk imposed by characteristics of the built environment (Mileti, 1999), as its determining factor. As researchers progressed through the study of vulnerability, the definition has grown to encompass social characteristics. Definitions of vulnerability commonly read as variations of "the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard" (Blaikie, Cannon, Davis, & Wisner, 1994).

2.1.1. Renters as a Vulnerable Population

Housing is used as an indicator to determine how well a community has recovered after a disaster. Housing is highly regarded in this manner because it acts as the catalyst to bringing stability back into a resident's life. Once stable, residents can continue the lives they had previous to the disaster (Bates & Peacock, 1987; Bates & Peacock, 1993; Peacock, Dash, & Zhang, 2007; Peacock, Zhang, & Dash, 2005).

Studies have found housing tenure – whether a household owns or rents a unit – as a major factor when monitoring social vulnerability (Peacock et al., 2014). Characteristics of renters often mirror those to indicate social vulnerability including being of low income, minority, living in low-quality housing (Kreimer, 1980; Morrow, 1999; Peacock, Dash, & Zhang, 2007), and lacking or having limited control of resources (Van Zandt et al., 2012). Due to these factors, renters are more susceptible to the greater impacts of natural disasters than homeowners.

Low income renters are at an even greater risk than those of higher incomes. Researchers have found that because low income renters have a lack of resources, they are more likely to be less prepared in the wake of a natural disaster in comparison to higher income residents (Katrakis, Knight, & Cavallo 1994; Rosenbaum, 1996). In addition, low-income households (and therefore renters) are also more likely to live in housing located in areas exposed to natural and technological hazards, in older housing built to lower code standards, and in housing with various maintenance deficiencies

(Katrakis, Knight, & Cavallo 1994; Rosenbaum 1996; Kreimer, 1980; Morrow, 1999; Peacock, Dash, & Zhang, 2007).

The physical structures renters commonly reside in also increase their vulnerability to disasters. Renters do not possess much, if any, autonomy regarding modifications, enhancements, and repair of their units (McCarthy, Van Zandt, & Rohe, 2001; Tapsell, McCarthy, Faulkner, & Alexander, 2010; Van Zandt & Rohe, 2011). Landlords typically reserve power to control how a unit is maintained, which could result in a renter living in a unit that is non-resistance to disasters and their damages. As most renters lack control as to when or if their unit will be rebuilt or fixed after disasters, they are often displaced (Peacock, Dash, & Zhang, 2007). Other disproportionate barriers renters face includes the inability to afford flood insurance and minimal access to reliable disaster information (Tapsell, McCarthy, Faulkner, & Alexander, 2010; Burby, Steinberg, & Basolo, 2003; Zhang & Peacock, 2010). All factors leading to a slower recovery post disaster.

2.2. Housing Choice Voucher Program

The Housing Choice Voucher (HCV) program is administered by the U.S. Department of Housing and Urban Development (HUD) and serves as the federal government's major program for assisting very low-income families, the elderly, and the disabled to afford decent, safe, and sanitary housing in the private market (U.S. Department of Housing and Urban Development, n.d.). The HCV was created to

decrease and eliminate poverty concentrations and provide low-income households with greater access to higher opportunity neighborhoods (Tighe, Hatch, & Mead, 2017).

Though this program has good intentions, much like any program or intervention, the HCV program has persistent barriers that affect its effectiveness. The success of this program is dependent upon the HCV recipients locating in higher opportunity, lower poverty neighborhoods. These outcomes are dependent upon landlord acceptance of the voucher, an adequate amount of affordable housing, and prevalence of social ties, amongst many other factors (Tighe, Hatch, & Mead, 2017). An important suggestion to note was mentioned by Wood, Turnham, & Mills, "voucher assistance alone, without constraints on location or supplemental counseling or search assistance, does not result in substantial improvements in neighborhood characteristics" (2008). Voucher assistance coupled with other factors are needed to ensure the successful implementation of this program.

2.3. Mechanisms Used to Increase Affordability

2.3.1. Fair Market Rent

Fair Market Rents (FMRs) are used to define payment standards that govern the amount of assistance that Housing Choice Voucher Program (HCV) participants receive (Kahn & Newton, 2013). FMRs were historically calculated at the metropolitan level, thus painting rent in areas with a wide brush. This section will discuss the mobility outcomes for voucher recipients when HUD required the use of FMRs. Major patterns in mobility outcomes are dependent upon the base location, amongst other factors, but

common trends have emerged when analyzing the impacts of the mobility of voucher holders.

2.3.1.1. Mobility Outcomes

HCV mobility outcomes using FMRs from previous studies have found only small improvements when comparing neighborhood qualities and conditions between original and new neighborhoods (Feins & Patterson, 2005; McClure, Schwartz, & Taghavi, 2014; Wood, Turnham, & Mills, 2008). Movers slightly improve various factors after their move in comparison to their previous residences.

Studies analyzing HCV mobility outcomes are mixed, and sometimes conflicting. Many studies find that despite singular factors being improved, overall, HCV holders are only making small improvements in their moves (Feins & Patterson, 2005; Basolo, 2013; Basolo & Nguyen, 2005; Wood, Turnham, & Mills, 2008). When comparing to previous residences, voucher holders are not accessing areas of less poverty, (Basolo & Nguyen, 2005; McClure, Schwartz, Taghavi, 2014; Wang, Varady, & Wang, 2008; Holloway, 2014; Eriksen & Ross, 2013), clustering in low poverty areas same or higher levels of clustering and concentration (Varady, 2010, Wang, Varady, & Wang, 2008; Varady, Wang, Wang, & Duhaney, 2010; Walter, Li, & Atherwood, 2015), more distressed neighborhoods (Schwartz, McClure, & Taghavi, 2016), but ultimately achieving high stability in housing (Skobba, Bruin, & Yust, 2013, Wood, Turnham, & Mills, 2008). The improvements are also coupled with less positive results, after moves.

Social interaction and ties are common lost as a family decides to move from their previous residence (Keels, 2008),

A study conducted by Victoria Basolo in California showed that overall, movers did not have better outcomes than those of nonmovers, however, when comparing the conditions of pre- and post-residences, movers lived in neighborhoods with lower poverty rates and better school quality (Basolo, 2013). The employment of movers dropped significantly though after the move. A study conducted by Basolo and Nguyen in California showed that of their subjects who moved, their moves resulted in improved neighborhoods for only one subset of the movers. Basolo found that when comparing conditions of mover's previous residences, they lived in lower impoverished neighborhoods with high quality schools. However, these outcomes were not better than those of nonmovers.

There is a difference in outcomes when viewing nonmetropolitan areas. Walter and Wang found voucher households in nonmetropolitan areas have lower incomes and tend to be younger with higher percentages of single mothers and families with children (2017). The authors also found voucher households in nonmetropolitan areas are also less concentrated and have access to higher opportunity neighborhoods.

Race and ethnicity greatly affected the mobility outcomes. Minorities, particularly Black or African American residents, saw disproportionate negative impacts after moving (Briggs, Comey, & Weismann, 2010; Holloway, 2014; Walter, Li, & Atherwood, 2015; Wagmiller, 2011). In one study, researchers noted being African American, experiencing a job loss, and reporting hard drug use significantly increase the

probability of experiencing negative mobility (Briggs, Comey, & Weismann, 2010). This details how significant race and ethnicity is when selecting a new home.

Race and ethnicity matters. Non-Hispanic White HCVP households are able to enter low-poverty neighborhoods at a rate greater than the availability of affordable units, whereas minorities are not (McClure, 2013). Being non-Black, having a larger household, and originating from economically distressed areas with high poverty and unemployment relates more strongly to relocation to neighborhoods with greater opportunity (Walter, Li, & Atherwood, 2015).

2.3.1.2. Discussion of Mobility Outcomes

Studies were conducted to find why the HCV program was not fully achieving its desired mission. They found barriers that consistently reduced the effectiveness of the HCV program, metropolitan levels for FMRs, race and ethnicity,

The number of moves also plays a role in the level of neighborhood improvement. Though the difference is small, moving at least once is associated with neighborhood quality improvements and more moves resulted in incremental improvement neighborhood improvements (Feins & Patterson, 2005).

FMRs being set at the metropolitan level gave an inaccurate depiction of the actual fair market rent of the area, allowing many expensive, high opportunity areas to be nearly impossible for HCV holders to access (Reina, Acolin, & Bostic, 2019). A more localized pricing system was given as a solution to improve the use of FMRs, thus earmarking the introduction of SAFMRs (Geyer, 2017; McClure, 2013).

McClure, Schwartz, and Taghavi found that housing voucher families move to areas of the same or higher levels of poverty than that of their previous residence. In their study, approximately one in five voucher households were located in low-poverty neighborhoods. This trend was especially apparent among Black and Hispanic households (Schwartz, McClure, and Taghavi, 2016). "Minorities live in more impoverished, overcrowded neighborhoods than nonminorities, even when controlling for mobility status, contract rent, and other factors" (Basolo and Nguyen, 2005). When comparing those who move with vouchers and those who do not, Basolo found that employment significantly drops after the move.

An interesting finding was upon residents receiving HCVs, they often leased in nearby units to secure the subsidy, and continued to look for housing in lower poverty neighborhoods (Eriksen & Ross, 2013). The nearby areas were also of high poverty. This shows the difficulty recipients face when attempting to find housing and could explain why it takes voucher recipients multiple subsequent moves to slightly better neighborhoods (Feins & Patterson, 2005). The metropolitan level for FMRs, tight housing market, and landlord discrimination could have caused this result.

2.3.2. Small Area Fair Market Rent

Instead of using metropolitan areas to calculate FMRs, Small Area Fair Market Rents use a smaller area zip codes, a smaller area. The more localized approach allows pricing to more accurately reflect the market on a smaller scale in hopes of allowing HCV holders to access higher opportunity neighborhoods. Higher opportunity

neighborhoods are typically more expensive. Ultimately, the success of the HCV program is dependent upon the location of use. HUD highlights two main benefits of SAFMRs, "they can provide voucher holders greater access to high-opportunity areas and make the voucher program more cost effective" (U.S. Department of Housing and Urban Development, n.d.).

Literature detailed the mobility outcomes of households using SAFMRs are limited, however, they follow many themes and trends that were persistent with FMRs. These mixed results highlight some of the potential incremental benefits of the program and reinforce the importance of viewing this policy over a longer period of time and in the context of other constraints voucher households face in accessing neighborhood opportunity (Reina, Acolin, & Bostic, 2019).

2.3.2.1. Mobility Outcomes

As SAFMRs are fairly recent in introduction, minimal literature has been produced to evaluate its effectiveness. However, from the studies that have been conducted, SAFMRs persist with similar outcomes of FMRs. SAFMRs have found only minimal improvements in terms of neighborhood quality (Reina, 2019; Ellen, 2018), disproportionate negative impacts for minorities (Reina & Winter, 2016; Reina, 2019), and that in some cases, vouchers are left unused (Schwartz, Mihaly, & Gala, 2017; Reina & Winter, 2016). However, SAFMRs have been shown to reduce rent burdens, crowded homes, risk of homelessness (Ellen, 2018).

Other studies have found that HCV recipients elect to stay in place, even with the issuance of a voucher. This trend indicates there must be significant barriers voucher holders are facing when attempting to move. Further research must be conducted to discover identify what the barriers are.

2.3.2.2. Discussion of Mobility Outcomes

Specific barriers have been identified that could respond to why the results are what they are. Though SAFMRs provide a more accurate depiction of the fair market it, it alone is not enough to ensure HCV recipients are fully able to access higher opportunity areas. Other factors must be added in addition to SAFMRs to truly achieve the desired impacts.

Literature states that SAFMRs, and even vouchers, alone not enough to fulfill the program's desired outcomes. Due to the complexities of issues are barriers HCV recipients' face, additional actions must be taken and services provided to help HCV holders find better neighborhoods (i.e., housing counseling) (Schwartz, 2019).

2.4. Challenges HCV Recipients Face when Seeking Housing

The causation of HCV recipients not overwhelmingly finding better neighborhoods is caused by various barriers and factors. Market and voucher constraints, discrimination, definition of opportunity, and social capital are all barriers HCV recipients face when searching for housing (Tighe, Hatch, & Mead, 2017; Schwartz, Mihaly, & Gala, 2017; Clampet-Lundquist, 2004).

2.4.1. Market and Voucher Constraints

The HCV program itself has been criticized of having a limited reach. The waiting time for families to receive a voucher can span over numerous years. Only one in four households eligible for a voucher nationally receives any federal rental housing assistance (Ellen, 2018). Public housing authorities (PHAs) have a finite amount of vouchers available for potential recipients.

After surpassing the initial challenge of the waitlist, the lack of affordable housing units within higher opportunity neighborhoods present yet another challenge for HCV recipients. Tight rental housing markets coupled with payment standards that are too low, make finding affordable rental housing difficult for HCV recipients (Schwartz, Mihaly, & Gala, 2017). Other studies suggest that when HCV recipients are able to live in any neighborhood or unit that accepts the voucher, they often located in subsidized developments because very few private market units are available (Williamson, Smith, & Strambi-Kramer, 2009).

Compounded on the issue of lack of units, the time frame HCV recipients have to locate a unit also presents itself as a barrier. HUD stipulates voucher recipients to locate a rental unit within sixty days of receiving their voucher and failure to accomplish this would result in loss of voucher. The stress of finding a rental unit in a tight or inflexible market within sixty days can place a large burden on HCV recipients.

Due to the aforementioned compounded issues and the complexities of each HCV recipient, researchers have argued providing only a voucher for residents is not enough.

Vouchers supplemented with housing counseling and search assistance, aggressive landlord outreach, service, and incentives, and source-of-income anti-discrimination laws are a few mechanisms to improve the performance of the program (Turner, 1998; Ladd & Ludwig, 1997; Tighe, Hatch, & Mead, 2017).

2.4.2. Discrimination

HCV recipients often face discrimination based on race and ethnicity as well as their source of income. Some landlords will often provide misinformation to voucher holders to deter them from wanting to choose their units. (Tighe, Hatch, & Mead, 2017).

Race and ethnicity continue to play a role in the mobility outcomes of HCV recipients, despite the introduction of SAFMRs. Minorities, especially Black recipients, are not accessing high opportunity areas, but White recipients are. Wang and Walter found that White, non-Hispanic households and those with higher incomes were more likely to move to lower poverty neighborhoods, whereas disabled and formerly homeless households moved more frequently and were not as success in accessing lower poverty areas (2018).

Landlord discrimination and racial segregation are serious barriers for the predominantly African American HCV residents (Schwartz, Mihaly, & Gala, 2017; DeLuca, Garboden, & Rosenblatt, 2013; Varady et al., 2010). When looking at African Americans, reasons why they were unable to escape disadvantaged neighborhoods were tenants' limited housing search resources, involuntary mobility, landlord practices, and several aspects of the voucher program itself (DeLuca, Garboden, & Rosenblatt, 2013).

The HCV program also has not led to a greater dispersion of voucher recipients and either poverty or racial deconcentrating for Black residents (Varady et al., 2010). Such discrimination from landlords could be the cause that households neglect to use their vouchers and elect to stay in place (Ellen, 2018)

2.4.3. Loss of Social Capital

Social capital is defined as the social relationships that allow residents access to resources generated by the community (Bourdieu, 1985; Coleman, 1988; Putnam, 1998). It is commonly referred to as the benefits that accrue from social relationships within communities and families (Higgit & Memken, 2001).

Social capital and engagement play a role in where HCV recipients choose to locate as well. When a recipient elects to move from their current residence, they are potentially physically distancing themselves from the social ties and capital they accumulated while living in their original community. Friendships, daycare, and culturally inclusive shopping amenities could all be lost when moving away. To keep those ties, some voucher holders decide say in their existing communities. “Neighbors may serve as important support systems for each other if they provide emotional support and assistance with tasks or make material goods available for others to borrow” (Schwarz, Mauksch, & Rawls, 1995). However, these findings do not negate the serious structural deficiencies that made these communities cluster in this manner to begin with, but highlights the social factors and influences that swayed their decision. “Residents believe their current neighborhood is an improvement over their former one if the

neighborhood has an adequate level of stimulation, and residents feel at home in their neighborhood (Gifford, 1997). Dense neighborhood social networks may facilitate people looking out for one another and exchanging resources (Higgit & Memken, 2001).

A sense of belonging also plays a role in disaster preparedness. Neighborhood belonging increases the likelihood of taking preparedness actions during Hurricane Ivan, but not prior to it (Kim & Kang, 2010). Brisson, Peña & Plassmeyer wrote that neighborhood social cohesion has the potential to protect families from the harmful consequences associated with living in a low income neighborhood (2018).

The inability of movers to connect with neighborhood social structures made it difficult to move into less poor neighborhoods to take advantage of the improved opportunities of their new neighborhoods (Clampet-Lundquist, 2004). Rachel Kleit found that though dispersed residents have a more diverse neighborhood social network than clustered residents, they do not use their neighbors as frequently when looking for a job (2001).

Literature has also been written examining the link between mobility and neighborhood effects. It ultimately shows that even though families may move into higher opportunity areas, there are still tradeoffs. In a study conducted by Keels found that Black children primarily benefited from the institutional interaction, meaning the accessibility to resources. However, the children did not benefit as much from the social interaction resources like they might have in their previous neighborhoods (2008). When looking at the academic achievement of children, though they have access to greater opportunity post-move, they are still unable to take full advantage of it (Johnson, 2012).

One complication Johnson found for this occurrence was the existence of cultural discontinuities, the children were not able to fit into the new culture they were thrust into.

Contradictory to these previously mentioned studies, one conducted by Varady and Walker found that those who moved to the suburbs were more likely to move into neighborhoods with higher socioeconomic status and experience better residential conditions including experiencing few adjustment problems with neighbors and landlords. The children also made a quick adjustment to their new schools (2003).

3. METHODOLOGY

To examine and analyze the differences between original and new neighborhoods, this study used HCV recipient data provided by the Houston Housing Authority. This project utilized descriptive and bivariate research methods to conduct the analysis. This study examined the neighborhood conditions HCV recipients moved into post-Hurricane Harvey, comparing these conditions to the neighborhoods they lived in at the time that Hurricane Harvey struck.

3.1. Research Sample and Data Sources

The sample used for this study consisted of all HCV households who were displaced by damage from Hurricane Harvey. Their addresses were used to determine neighborhood locations at the time of the disaster, as well as the location of their unit after relocating following the hurricane. The sample size composed of 597 residents before Hurricane Harvey and 477 after Hurricane Harvey. The data regarding HCV recipients were provided by the Houston Housing Authority (HHA). A full dataset of household, neighborhood, and flood-related data was generated using data from the City of Houston, Houston-Galveston Area Council, and University of South Carolina (USC).

The primary tool used for this analysis was Geographic Information Systems (GIS). GIS was utilized to spatially analyze the difference between original and new neighborhoods. Difference-of-means tests were conducted in Excel.

Data overlays analyzed in relationship to HCV addresses include overlayed with the: the nearest amenities (such as parks, hospitals, schools, community centers, libraries), median household income by census block group, and social vulnerability.

3.2. Research Design

This study examined the change between pre and post neighborhood characteristics for HCV holders to determine if they were able to access higher opportunity neighborhoods after Harvey. Addresses were labelled as Original and New and will be referred to as such from this moment on. Both sets of addresses were geocoded into points using ArcGIS Online and then transferred into ArcMap to continue the analysis. The neighborhood points were spatially joined to the characteristics used in this analysis. The summary tables for Original and New Neighborhoods were exported from ArcMap into Microsoft Excel. A paired two sample for means t-test was used to determine the significance between the changes in neighborhoods.

Buffers were created in ArcMap to discover which resources and amenities were within necessary proximity to original and new neighborhoods. Libraries needed to be within 1.5 miles from residences. Schools at 2.5 miles away from residences, the values were an average between primary and secondary school travel distance. Hospitals were assessed at least 5 miles away from residences. Parks were assessed at 0.5 miles from residences and community centers were assessed at 1.5 miles away from residences. Results were assessed on a on a scale of 0 and 1. 0 indicated that the residence was not within the buffer and 1 indicated residence within the buffer.

Social vulnerability was originally categorized as very low, low, medium, high, and very high. Very low indicating areas with the lowest levels of social vulnerability and very high indicating the highest levels of social vulnerability. For the analysis, these categories were labelled from 0 to 4, 0 being the very low level and 4 being the very high level.

Twenty-nine variables were used to categorize the original and new neighborhoods. The twenty-nine variables were grouped into four categories, Neighborhood Characteristics, Neighborhood Demographic Characteristics, Floodplains, and Resources and Amenities. Table 1. shows the variables used in this analysis, how they were measured, and source of the data.

Table 1. Description and Measurement of Study Variables

Variables	Description	Data Source
	Neighborhood Housing Characteristics	
Renter	Percent of renters in neighborhood	Social Vulnerability Index – USC
Vacancy rate	Percent of vacant homes in neighborhood	Social Vulnerability Index – USC
Unemployed	Percent unemployed in neighborhood	Social Vulnerability Index – USC
Poverty rate	Percent impoverished in neighborhood	Social Vulnerability Index – USC
Median income	Percentage of median income in neighborhood	Social Vulnerability Index – USC
Median house value	Percentage of median house value in neighborhood	Social Vulnerability Index – USC
Median Gross Rent	Percentage of median gross rent in neighborhood	Social Vulnerability Index – USC
	Neighborhood Demographic Characteristics	
Average age	Average age of neighborhood residents	Social Vulnerability Index – USC

Table 1. Continued

Variables	Description	Data Source
	Neighborhood Demographic Characteristics	
Female Headed Household	Percent of female headed households in neighborhood	Social Vulnerability Index – USC
Speaking English as a Second Language with limited English Proficiency	Percent of neighborhood speaking English as a second language with limited English proficiency	Social Vulnerability Index – USC
Less than 12th Grade Education	Percent of neighborhood with less than a 12th Grade Education	Social Vulnerability Index – USC
Hispanic	Percent of Hispanic residents in neighborhood	Social Vulnerability Index – USC
Non-Hispanic	Percent of Non-Hispanic residents in neighborhood	Social Vulnerability Index – USC
Black	Percent of Black residents in neighborhood	Social Vulnerability Index – USC
Native American	Percent of Native American residents in neighborhood	Social Vulnerability Index – USC
Asian	Percent of Asian residents in neighborhood	Social Vulnerability Index – USC
White	Percent of White residents in neighborhood	Social Vulnerability Index – USC
Native Hawaiian or Other Pacific Islander	Percent of Native Hawaiian or Other Pacific Islander residents in neighborhood	Social Vulnerability Index – USC
2 or More Races	Percent of 2 or More Races in neighborhood	Social Vulnerability Index – USC
Other	Percent of Other race residents in neighborhood	Social Vulnerability Index – USC
	Floodplain and Social Vulnerability	
X	Area of moderate flood hazard, above the 500-year flood level; coded at 0	Houston-Galveston Area Council
AE	The base floodplain; coded as 1	Houston-Galveston Area Council
AO	River or stream flood hazard areas; coded as 1	Houston-Galveston Area Council
Social Vulnerability Index	Level of social vulnerability; coded as very low, low, medium, high, and very high	Social Vulnerability Index – USC

Table 1. Continued

Variables	Description	Data Source
	Resources and Amenities	
School	School within 2.5 miles of neighborhood, took average between primary and secondary school travel distance	City of Houston
Library	Library within 1.5 miles of neighborhood	City of Houston
Hospital	Hospital within 3 miles of neighborhood	City of Houston
Park	Park within 0.5 miles of neighborhood	City of Houston
Community Center	Community Center within 1.5 miles of neighborhood	City of Houston

4. RESULTS

The purpose of this study was to compare the neighborhood quality of HCV residences before and after Hurricane Harvey. Original and new neighborhoods were compared to determine whether HCV recipients are indeed accessing higher opportunity neighborhoods. The results were divided into five categories: Neighborhood Housing Characteristics, Neighborhood Demographic Characteristics, Neighborhood Floodplain Identification, Resources/Amenities, and Social Vulnerability. The immediately following sections will discuss the findings for each category. This section only includes variables that are significant or highly significant. Variables not meeting this distinction were excluded. Maps showing Mobility Outcomes, Resources and Amenities, Floodplains, Social Vulnerability Index, and Payment Standard concentration can be found in Appendix A; beginning with Figure 1. The results of this study are showcased below, in Table 2.

Table 2. Results from Statistical Analysis

	Original Neighborhood	New Neighborhood	Change
Neighborhood Housing Characteristics			
Renters	49.72%	42.36%	-7.36%**
Vacancy rate	9.28%	13.88%	4.59%**
Unemployed	28.86%	27.75%	-1.10%*
Poverty rate	26.93%	23.89%	-3.04%**
Payment Standard	62.48%	63.10%	0.62%
Neighborhood Demographic Characteristics			
Average age	30.14	30.78	0.64*

Table 2. Continued

	Original Neighborhood	New Neighborhood	Change
Neighborhood Demographic Characteristics			
Female Headed Household	50.45%	51.39%	0.94%*
Percent Black	45.80%	48.00%	2.21%*
Percent Native American	0.19%	0.18%	-0.01%*
Percent Asian	1.70%	2.23%	0.53%*
Percent White	12.92%	10.21%	-2.70%*
Percent Native Hawaiian or Other Pacific Islander	0.03%	0.02%	-0.01%*
Other	0.09%	0.13%	0.04%**
Percent with Less than 12th Grade Education	34.15%	29.98%	-4.17%**
Floodplain/Social Vulnerability			
Percent within Floodplain	20.94%	18.70%	-2.24%
Social vulnerability Index	31.55%	28.11%	-3.44%**
Resources and Amenities			
Library	50.42%	39.08%	-11.35%**
Park	54.27%	41.72%	-12.55%**
Community Center	53.60%	41.72%	-11.88%**

*p≤0.01 **p≤0.001

4.1. Neighborhood Housing Characteristics

Of the seven variables tested for original and new neighborhood change significance, one was significant and three were highly significant. There was a highly

significant decrease in the percentage of renters in the new neighborhoods and a highly significant increase in the vacancy rate.

4.2. Neighborhood Demographic Characteristics

Overall, the new neighborhoods saw slightly more minority and female headed households, with higher levels of education in comparison to the original neighborhoods. Neighborhoods with higher minority concentrations and female headed households are often associate with lower opportunity areas, a trend resulting from years of disenfranchisement and discrimination towards these groups.

4.3. Neighborhood Floodplain Identification and Neighborhood Social Vulnerability

Although fewer new neighborhoods were located in floodplains, there was no statistical difference when comparing the decrease. This means that HCV recipients are not access neighborhoods outside of the floodplain. The results show that HCV recipients are moving into less socially vulnerable areas of Houston, due to the highly significant decrease in social vulnerability.

4.4. Neighborhood Resources/Amenities

There were highly significant decreases in the proximity of libraries, parks, and community centers within the designated boundaries. Taking the previous findings into account, there appears to be a tradeoff between risks. HCV recipients may access

neighborhoods of lower poverty rates and higher educational attainment; however, resources and amenities are further away from their residences.

5. DISCUSSION

The primary purpose of this research study was to examine the quality of HCV recipients' new neighborhoods in comparison to the original. Previous literature often signifies higher neighborhood quality by low poverty rates, low minority concentration, accessible resources, (Wang & Walter, 2018; Geyer, 2017; Walter, Li, & Atherwood, 2015; Feins & Patterson, 2005).

The study hypothesized that HCV recipients would move into low quality neighborhoods and it was not fully supported by the findings. HCV recipients moved to neighborhoods of lower poverty, higher educational attainment, lower unemployment, and lower social vulnerability. However, the new neighborhoods also had higher concentrations of minority families, with the highest percent being Black residents. New neighborhoods also were further away from resources and services. But, original and new neighborhoods did not see a significant change when comparing flooding vulnerability. The results of this study support that HCV residents are accessing higher quality neighborhoods

Though findings from current literature are highly based on location, the findings from this study do correlate with what is found in other studies. With the highly significant decrease in percentage of renters and vacancy rate in the new neighborhoods, it can be determined that movers are transitioning into less stable neighborhoods.

New neighborhoods also saw a reduction in employment and poverty rates, findings consistent with what some literature regarding the subject shows.

In the case of moving to higher minority concentrated neighborhoods, conducted to determine the validity of using minority concentration and female headed households as determinants of social vulnerability and opportunity. Current literature and guidelines set by HUD use these as indicators of neighborhood quality, however, due to the current change in socioeconomic characteristics of these demographics, research must be performed to determine if they are still solid indicators. The automatic assumption that because a neighborhood has a high concentration of minority residents or female headed households it must inherently have low socioeconomic status and opportunity is a problematic way to characterize these neighborhoods.

Social vulnerability. Though new neighborhoods are less socially vulnerable than original neighborhoods, no residents either original or new, resided in areas of very low social vulnerability.

These findings show the HCV program is working as intended, by allowing voucher recipients to access low poverty neighborhoods. However, this does not signify lasting victory of the program itself, modifications should be made to enhance recipients' opportunity to access higher opportunity neighborhoods. Tradeoffs for the neighborhood improvements were the amount of resources and amenities offered.

6. CONCLUSIONS

This research discovered the neighborhood quality for HCV recipients before and after Hurricane Harvey. The study found where HCV recipients located after navigating the tight housing market, characteristics of the new neighborhoods, resources and services within a designated proximity, and how the combination of these results compare to their previous residence.

The results from this study add to the current literature regarding housing in Houston and the effects Hurricane Harvey had on it. The specificity of the research question for this study allows it to be more applicable in the terms of Houston, however, as natural disasters become more frequent, perhaps knowledge from this and previous disasters can aid with the creation of a consortium of knowledge regarding housing and disasters.

There was a highly significant decrease in the percentage of renters in the new neighborhoods and a highly significant increase in the vacancy rate. The population of minorities, female headed households, educational attaintment levels increased in comparison to the original neighborhoods. There were fewer new neighborhoods in floodplains, but the difference was not statistically significant. New neighborhoods saw a highly significant decreases in the proximity of libraries, parks, and community centers within the designated boundaries. The culmination of these findings show there appears to be a tradeoff between risks and resources. HCV recipients may access neighborhoods

of lower poverty rates and higher educational attainment; however, resources and amenities are further away from their residences.

Overall, this study found that HCV recipients are moving into neighborhoods that are less stable, have lower poverty and social vulnerability rates, are further away from resources, and have higher concentrations of minority families and female headed households. Ultimately, the HCV recipients are moving into higher quality neighborhoods in comparison to their original neighborhoods.

6.1. Limitations

Limitations of this study are the time frames used as a comparison and scale of impacts. The periods used were a few months before and a year after Hurricane Harvey struck. Encompassing earlier dates could have shown a greater change over time in relation to neighborhood quality. Though these time periods give a brief description of neighborhood quality, they are still important in the initial discussion of where HCV recipients moved after Hurricane Harvey.

Another limitation would be the scale of impacts used in the dataset. Data for neighborhood characteristics were used at a block group level. Scaling up and using a larger scale could intensify the results discovered in this study.

6.2. Future Research

The findings from this study prompted various ideas for future research to provide deeper context behind the patterns and trends discovered.

Further research should address how the new residences perceive the accessibility of the resources available. In reality, spatial proximity and availability of resources do not necessarily equate to being accessible to residents. Future research should also determine the social accessibility of the resources. For example, how comfortable the HCV residents feel in their new neighborhoods in comparison to their old neighborhoods. Research should also set out to determine HCV recipients perceive quality of the resources and amenities pre and post move. Future research might also discover the quality of schools in original and new neighborhoods and if the moves equated to accessing better schools. These perceptions could then be compared to the measured accessibility monitors and quality of the resources. The study could determine if there is a link between the perceived and quantified accessibility of resources and their quality. This knowledge could help policy makers and PHA administration alike determine if there any interventions are needed to help mitigate the negative aspects.

Note that these findings were taken months before and nearly a year after Hurricane Harvey impacted Houston. Literature indicates some HCV recipients continue to move until they are more satisfied with their housing choices, which could result in better neighborhoods in the future (Wang & Walter, 2018). Future research should monitor the moves of these residences to see if there is any improvement in the years to come.

These finding indicate that some HCV households are able to overcome the many barriers cited in the literature to access lower poverty neighborhoods with a voucher. This finding also suggests that a comparison of HCV locational outcomes at

two time points, as commonly seen in the literature, may not tell us the full story. The positive mobility outcomes of voucher households over time may be concealed by new voucher households who have not moved far from their original locations or away from severely distressed neighborhoods (Wang & Walter, 2018). Future analysis may want to look at mobility over a longer period of time to grasp a deeper understanding of mobility in relation to neighborhood quality in Houston.

Schwartz, Mihaly, & Gala noted that a barrier researchers face when analyzing the HCV program is the stringent definition of opportunity (2017). In terms of their study. Literature has taken minority concentrations, and female headed households as a few indicators of neighborhood quality. If a neighborhood has a high concentration of the aforementioned populations, it is commonly deemed as a low opportunity or low-quality neighborhood. Future research should be conducted to determine if minority and female headed households are still indicators of opportunity. The definitions we use might be inadequate given the changing demographics in America.

The information from these future studies would provide an even deeper context behind results presented in this study. The culmination of these studies could also help guide future policy practices, program evaluations, and program administration.

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APPENDIX A

MAPS

Figure 1. Map of Mobility Outcomes

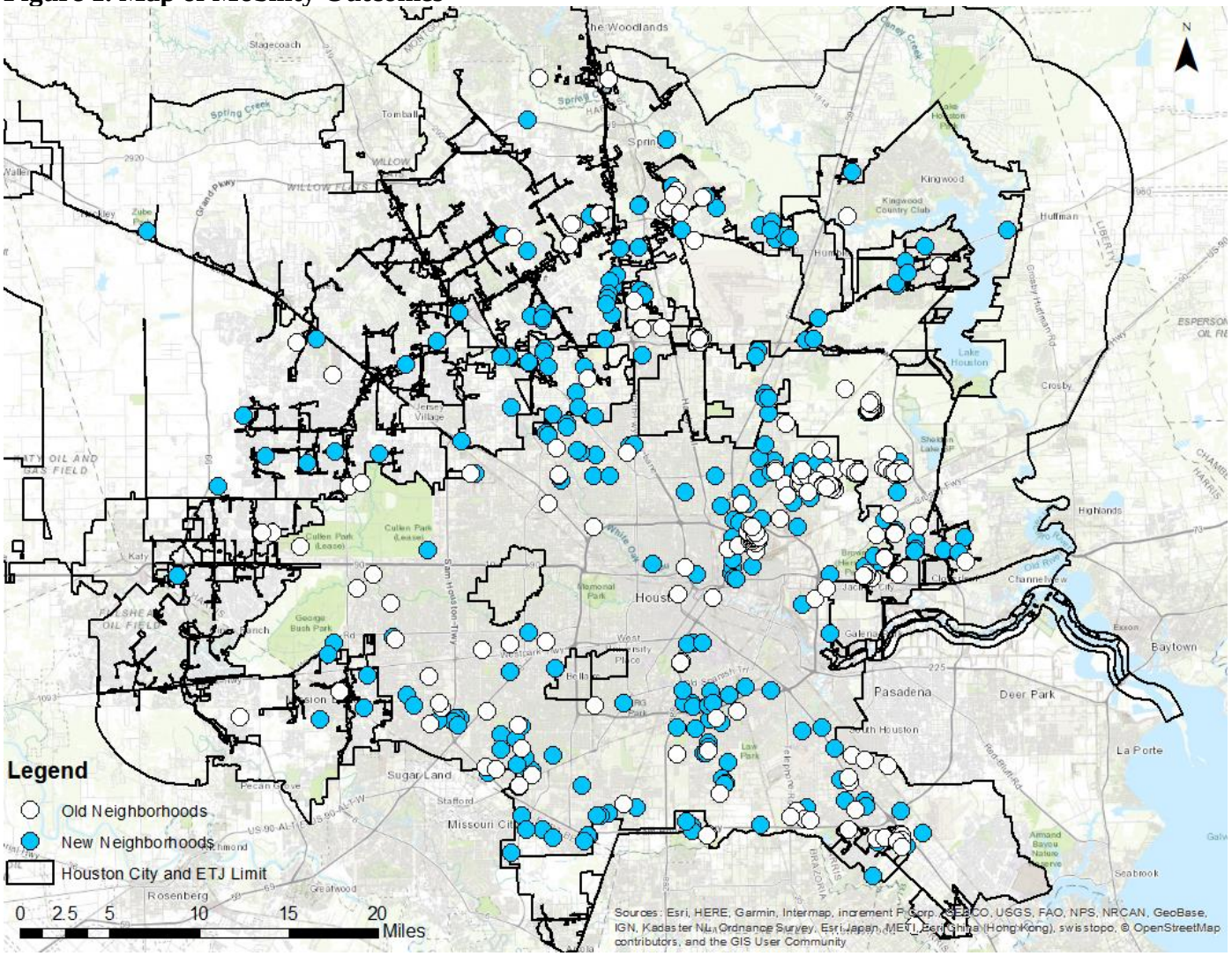

Figure 2. Map of Libraries

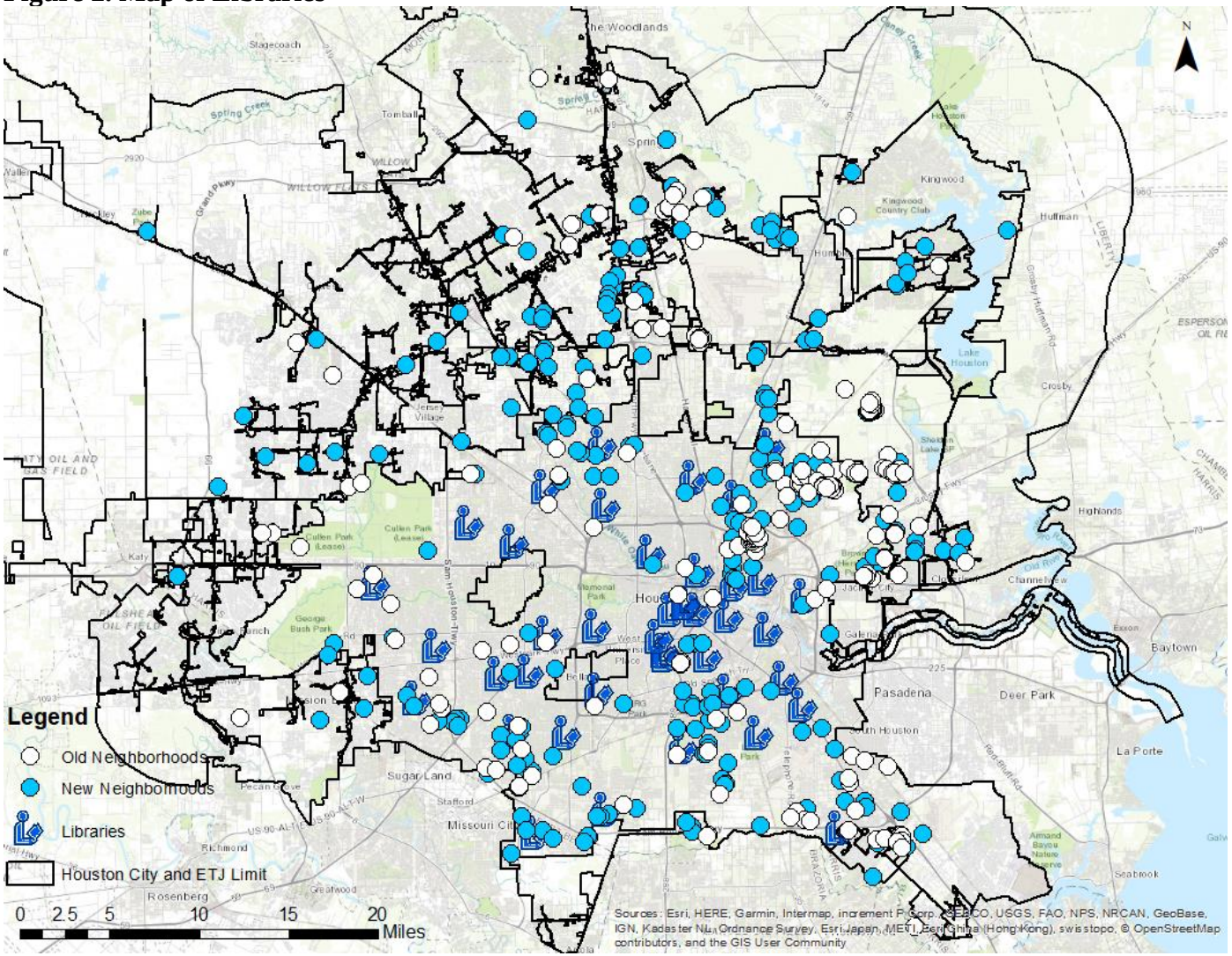

Figure 3. Map of Parks

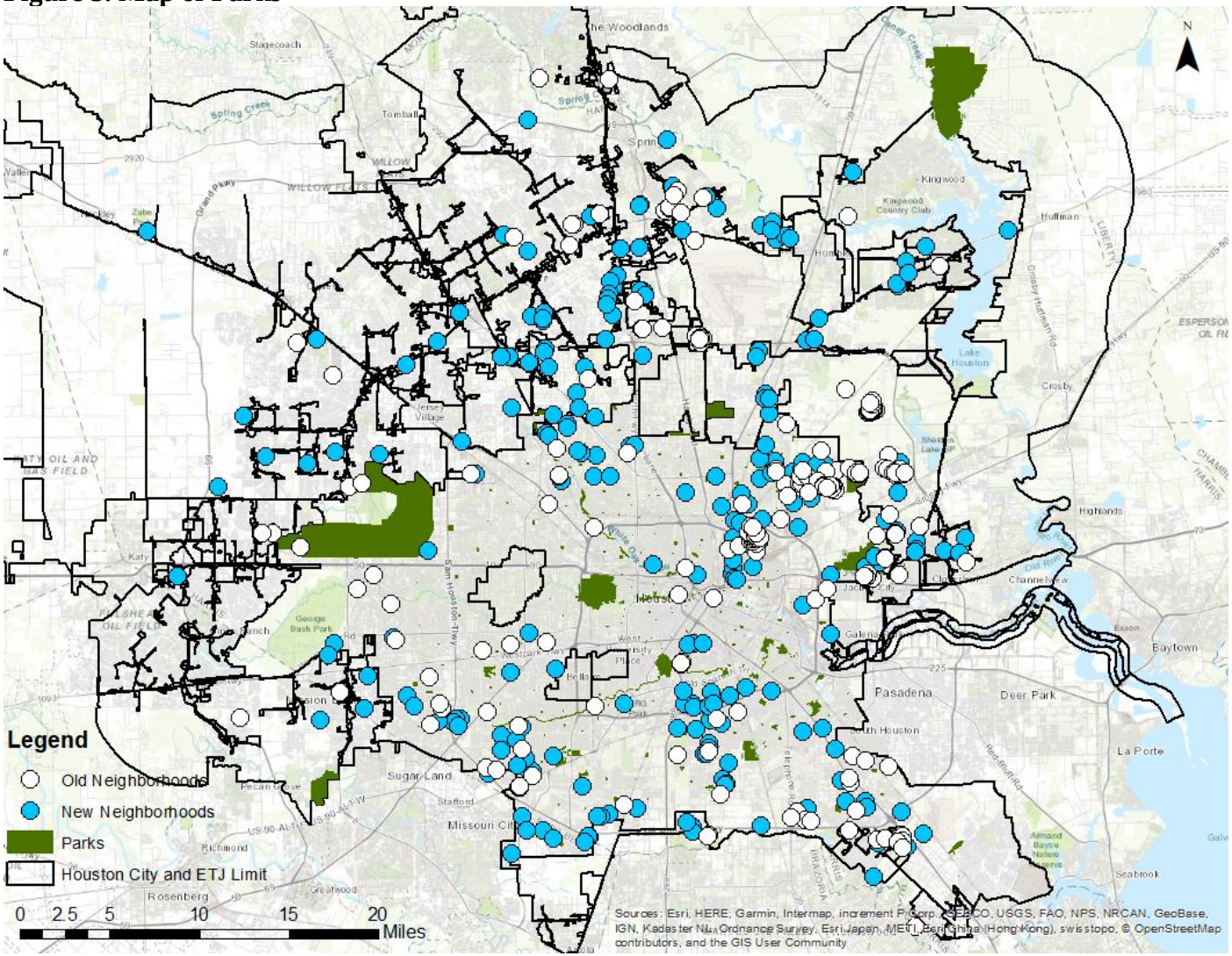

Figure 4. Map of Community Centers

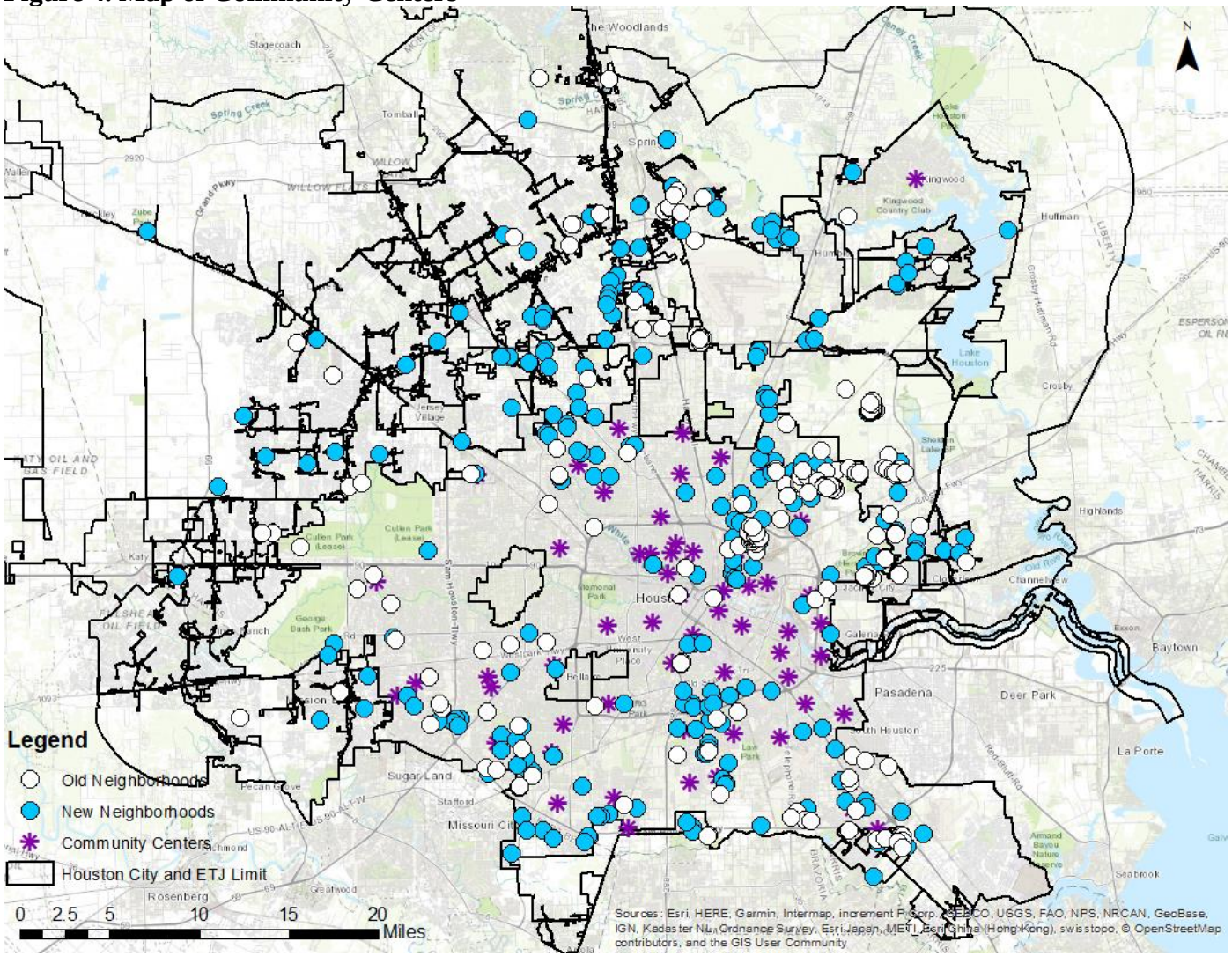

Figure 5. Map of Floodplains

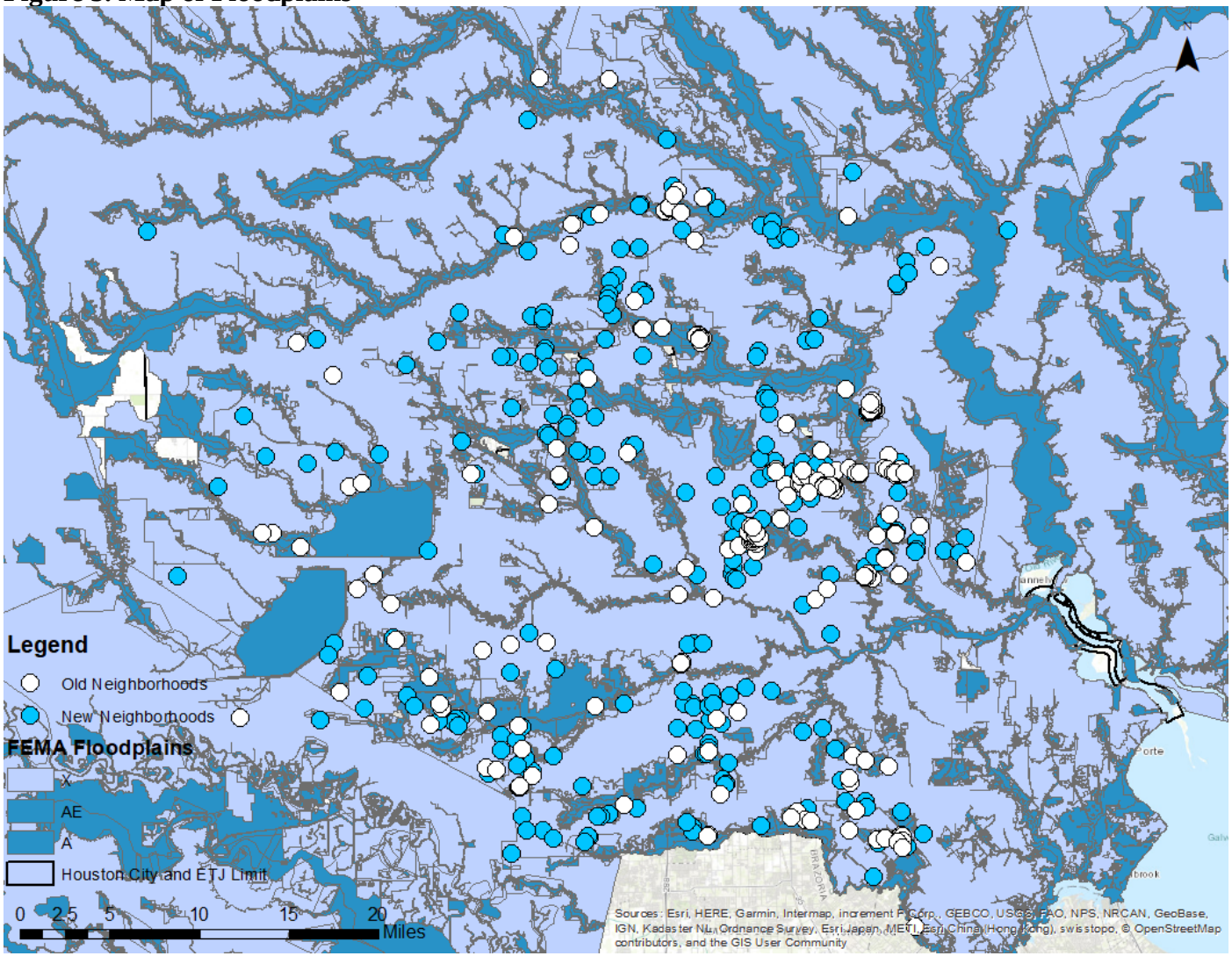

Figure 6. Map of Social Vulnerability Index

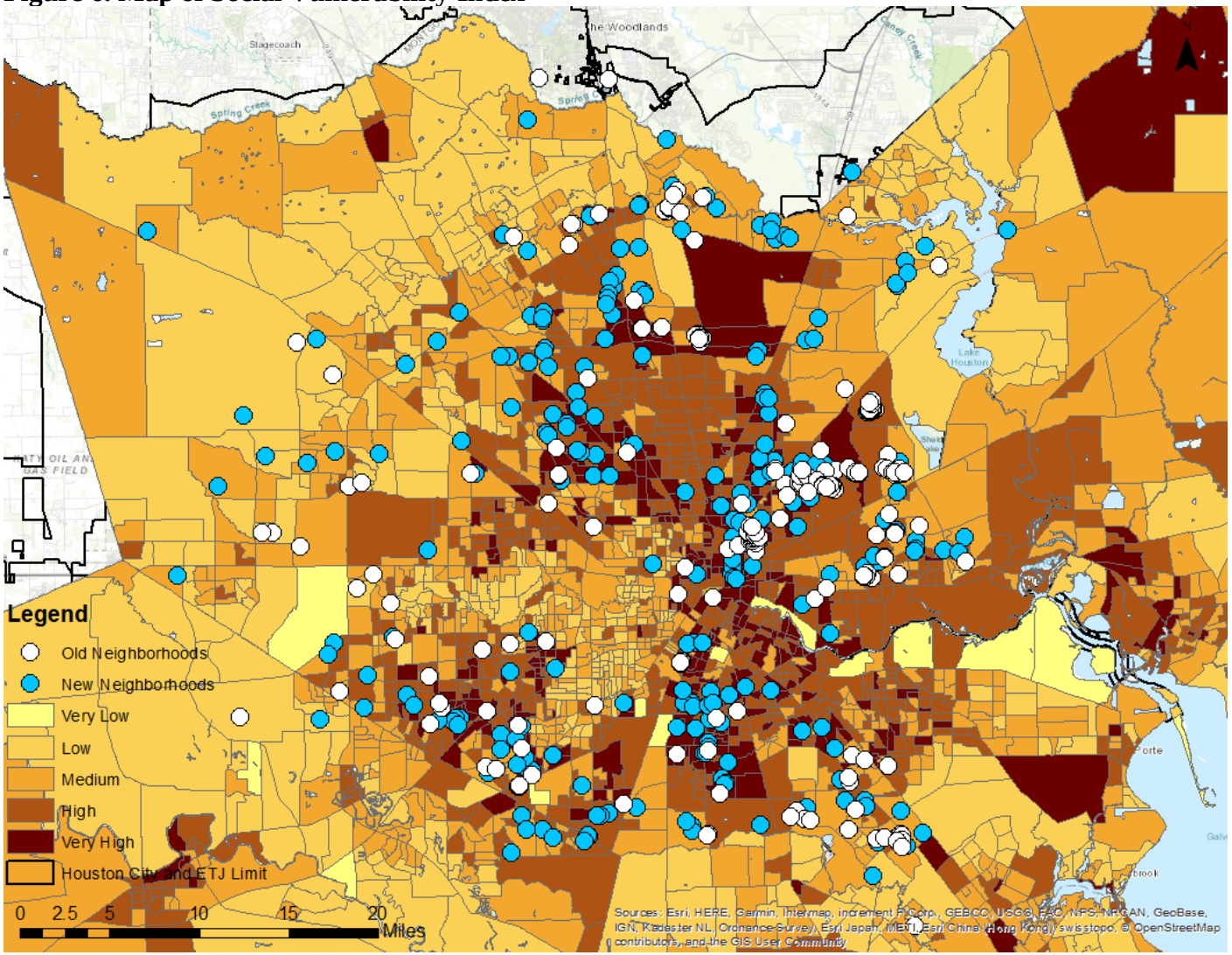

Figure 7. Map of Payment Standards